DOCUMENT RESUME

ED 139 946 CE 010 964

AUTHOR Vincent, Kenneth
TITLE Welding. Performance Objectives. Intermediate Course.
INSTITUTION Duval County School Board, Jacksonville, Fla.
PUB DATE Jul 73
NOTE 29p.; For a related document see CE 010 965

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS *Behavioral Objectives; Construction (Process); *Criterion Referenced Tests; Job Skills; Secondary Education; Shop Curriculum; Skill Development; Skilled Occupations; Technical Education; Trade and Industrial Education; *Welding

ABSTRACT

Several intermediate performance objectives and corresponding criterion measures are listed for each of nine terminal objectives for an intermediate welding course. The materials were developed for a 36-week (3 hours daily) course designed to prepare the student for employment in the field of welding. Electric welding and specialized (TIG & MIG) are emphasized. The titles of the nine terminal objectives sections are Electric Welding Terms, Care and Use of Shop Machinery, Physical Properties of Metals, Heat Treatment of Metals, Introduction to Arc Welding, Electric Arc Welding, (T.I.G.) Welding, (M.I.G.) Welding, and Blueprint Reading. (This manual and 54 others were developed for various secondary level vocational courses using the System Approach for Education (SAFE) guidelines.) (HD)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED139946

WELDING

PERFORMANCE OBJECTIVES

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

2

INTERMEDIATE COURSE

AE 010 964

DR. JOHN T. GUNNING

Superintendent of Schools

DUVAL COUNTY SCHOOL BOARD

Mr. William E. Carter, Chairman
Mr. Hugh Schulman
Mr. James S. Hornsby
Mrs. Gene Miller, Vice Chairman
Mr. William S. Mathias, Jr.
Mr. Wendell P. Holmes, Jr.
Mr. Joseph L. Cullen

Dr. Donald W. Johnson

Associate Superintendent, Curriculum

Mr. David A. Rigsby

Director of Vocational-Technical Education

Mr. David A. Brown

Supervisor of Industrial Education

Mr. Charles L. Downing

Supervisor of Industrial Education

Duval County Public Schools

July, 1973

ACKNOWLEDGEMENTS

This manual was developed using System Approach For Education (SAFE) Guidelines.

Appreciation and recognition are extended to the following who has assisted in the preparation of this manual:

Mr. Arthur Hilton, Coordinator
School Industry Education

The following Educator participated as the writer of this manual:

Mr. Kenneth Vincent, Instructor

Cover design & printing by:

Mr. Chester Sievert, Instructor

Typist: Miss Catherine Boatright

WELDING - INTERMEDIATE

Accreditation No. 9945

Length of course: 36 weeks

Time Block: 3 hours daily

COURSE DESCRIPTION

This course is designed to prepare the student for employment in the field of welding. Electric welding and specialized (TIG & MIG) are emphasized.

Intermediate course students will qualify in the following:

A. Electric Welding Terminology

B. Shop Machinery

C. Metal Properties

D. Heat Treating Metals

E. Arc Welding Fundamentals

F. Arc Welding Operations

G. (T. I. G.) Welding Operations

H. (M. I. G.) Welding Operations

I. Blue Print Reading

WELDING - INTERMEDIATE

9945

SYLLABUS OF TERMINAL PERFORMANCE OBJECTIVES

9.0 Electric Welding Terms

10.0 Care and use of Shop Machinery

11.0 Physical Properties of Metals

12.0 Heat Treatment of Metals

13.0 Introduction to Arc Welding

14.0 Electric Arc Welding

15.0 (T.I.G.) Welding

16.0 (M.I.G.) Welding

17.0 Blueprint Reading

ACCREDITATION NUMBER 9945

COURSE TITLE: WELDING - INTERMEDIATE

TERMINAL PERFORMANCE
OBJECTIVE NO. 9.0

ELECTRIC WELDING TERMS

Upon completion of this unit "Electric Welding" terms, the student will demonstrate his knowledge of these terms with 70% proficiency.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
9.1	Given lectures and demonstrations on "Electric Welding" terms. The student will write or orally describe terms associated with AC welding with at least 70% accuracy.	9.1	Name the two types of AC Arc welding machines. Define AC current.
9.2	Student will write or orally describe terms associated with D.C. welding with at least 75% accuracy.	9.2	Define the term D.C. Define the term direct polarity. Define the term reverse polarity. Define the term electrode.
9.3	Student will write or orally describe terms associated with T.I.G.welding with at least 75% accuracy.	9.3	Define the term "TIG". Name the three types of current flow used in TIG welding.

ACCREDITATION NUMBER 9945

COURSE TITLE: WELDING - INTERMEDIATE

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0

CARE AND USE OF SHOP MACHINERY

Upon completion of a series of lectures and demonstrations with shop machinery 80% of the students will be able to answer 70% of the questions on a written and/or oral test, and perform with 75% proficiency given performance test.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		10.0	TEST ATTACHED.
10.1	Given a piece of metal the student will demonstrate 80% proficiency in cutting a square 2" x 2" using the horizontal band saw according to rating scale: Locate Work 20 Secure Work 20 Select Proper Speed 20 Safety 20 Accuracy 20	10.1	Cut a 2" x 2" square with the horizontal band saw.
10.2	Given a piece of metal the student will demonstrate 75% proficiency in the proper and safe use of the pedestal drill press according to the following procedures: 1) Accurately locate and center punch hole on metal 2) Properly secure work 3) Operate drill press at proper speed and pressure 4) Observe all safety precautions.	10.2	Drill 5/16" - 3/8" - 1/2" holes according to specifications given you by the teacher using the pedestal drill press.
10.3	Given a piece of metal, the student will demonstrate 75% proficiency in the proper and safe use of the hydraulic press according to the following procedures: 1) Accurately locate and center the work in the press. 2) Properly secure the work 3) Apply pressure to the work with extreme caution 4) Observe all safety precautions	10.3	Operate the hydraulic press using proper procedures, to do the job assigned you by the instructor.

ACCREDITATION NUMBER 9945

COURSE TITLE: WELDING - INTERMEDIATE

TERMINAL PERFORMANCE OBJECTIVE NO. 10.0 — CARE AND USE OF SHOP MACHINERY

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
10.4	Given a taper shank drill bit the student will sharpen, by using a pedestal grinder, with 75% proficiency judged by below rating scale: 1) Safety 25% 2) Proper angle 25% 3) Proper methods 25% 4) Proper cooling 25%	10.4	Sharpen a drill bit on a pedestal grinder.
10.5	Given a piece of 24 gauge metal the student will cut a 12" x 28" piece, using the foot shear with 75% proficiency using the below rating scale: 1) Accurately locate metal in shear. 25% 2) Properly secure metal to be cut. 25% 3) Observe all safety precautions and shear metal. 25% 4) Accurate. 25%	10.5	Cut a 24 gauge piece of metal 12" x 28" using the foot shears.

10.0

1. What is the most likely way to break the blade in the horizontal band saw?

2. Is it necessary to disconnect the electricity while working on shop equipment?

3. What kind of safety equipment should always be worn when grinding metal?

4. Name (2) ways a person can easily be injured when operating the foot shear?

5. What is the most likely way that a person could be injured while operating the hydraulic press?

6. Is it a safe practice for more than one person to use a grinding wheel at the same time?

7. What determines the selected speed for the drill press?

8. What (2) factors determines the size of a band saw blade to use for a given job?

9. What tool is used to dress up a grinding wheel?

10. Is it necessary to have wheel guards in place for safe operation of the pedestal grinder?

ANSWER SHEET ON "CARE AND USE OF SHOP MACHINARY

10.0

1. Not having the work securely tight in the machine.

2. Yes

3. Safety shield or glasses.

4. (a) Foot pedal can cause injury to feet or legs.
   (b) Fingers caught under metal being sheared. etc.

5. Not having work securely tight in the machine.

6. No

7. Hardness of material to be drilled.

8. (a) Hardness of the material to be cut.
   (b) Cross sectional area of the work.

9. Wheel dresser.

10. Yes

ACCREDITATION NUMBER 9945

COURSE TITLE: WELDING - INTERMEDIATE

TERMINAL PERFORMANCE OBJECTIVE NO. 11.0 PHYSICAL PROPERTIES OF METAL

The student will score at least 80% on a written test relating to the physical properties of metals, and perform with 70% efficiency on a given performance test as judged by rating sheet attached.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
11.1	Given lectures and demonstrations on the physical properties of metals, the student will write or orally describe metallurgical terms with at least 80% accuracy.	11.1	1) Define the term "Tensile Strength" 2) Define the term "Ductility" 3) Define the term "Hardness" 4) Define the term "Brittleness" 5) Define the term "Malleability"
11.2	Given a piece of metal, the student will with 90% accuracy demonstrate knowledge of the physical properties of metals by applying certain forces to the metals as judged by attached rating scale. 1) Method 25% 2) Safety 25% 3) Tool Selection 25% 4) Machine Operations 25%	11.2	Given a piece of metal, apply the following forces to the metal: (Judged by rating sheet) 1) Bending 2) Twisting 3) Tension 4) Compression 5) Shearing
11.3	Given lectures and demonstrations on the physical properties of metals, the student will orally explain why a welder must be familiar with metal properties. 1) Method 2) Safety 3) Tool Selection 4) Machine Operations	11.3	Name 4 reasons why a welder must be familiar with metal properties.

11.0

PHYSICAL PROPERTIES OF METALS

1) What do the initials A.S.T.M. represent?

2) What is the spark test?

3) Is steel a 'ferrous' metal or a 'non-ferrous' metal?

4) Is 'ferrous' metal magnetic or non-magnetic?

5) Does 'lead' have the physical property of being tough?

6) Does the term 'elasticity' relate to spring steel?

7) Will aluminum give off sparks in the spark test?

8) Will alloy steel ring when tested with the 'ring test'?

9) What do the initials S.A.E. represent?

10) Brass is a ferrous or non-ferrous metal?

ANSWER SHEET FOR 'PHYSICAL PROPERTIES OF METALS'

1) American Society of Testing Metals.

2) Touching metal against a ~~spinning~~ moving grinding wheel.

3) Ferrous

4) Magnetic

5) No

6) Yes

7) No

8) Yes

9) Society of Automotive Engineers

10) Non-ferrous

ACCREDITATION NUMBER 9945

COURSE TITLE: WELDING - INTERMEDIATE

TERMINAL PERFORMANCE OBJECTIVE NO. 12.0

HEAT TREATMENT OF METALS

The student will score at least 80% on a written test relating to the heat treatment of metals and perform with 75% efficiency on a given performance test as judged by rating sheet attached.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		12.0	Test Attached.
12.1	Given lectures and demonstrations on the heat treatment of metals, the student will write or orally describe terms relating to heat treatment of metals with at least 80% accuracy.	12.1	1) Define: Heating 2) Define: Drawing 3) Define: Quenching 4) Define: Annealing 5) Define: Tempering
12.2	Given lectures and demonstrations on various methods of hardening steel, the student will heat a piece of steel and harden it with 100% proficiency as judged by attached rating scale. 1) temperature 25% 2) color 25% 3) cooling method 25% 4) safety 25%	12.2	Given a piece of steel and necessary heating equipment, heat treat and harden the metal.
12.3	Given lectures and demonstrations on the methods of heating metals for treatment the student will orally describe at least (3) methods.	12.3	Describe at least (3) methods of heating metals for treatment.
12.4	Given lectures and demonstrations on the cooling medias used in heat treating steel, the student will orally describe (3) basic methods.	12.4	Describe (3) methods used for cooling metals after heat treatment.

12.0

HEAT TREATMENT OF METALS

1) What is the purpose for 'annealing' metal?

2) How is steel hardened?

3) Can hard metals be softened by heat treating them?

4) Can soft metals be hardened by heat treating them?

5) Can water be used as a cooling agent when heat treating metals?

6) Is oil used as a cooling agent for heat treating metals?

7) What common heat treating device can a welder use to heat treat metals?

8) Spring steel receives most of its strength from the heat treating process.
T. or F.

9) Does metal expand or contract when heated?

10) Name two methods used for heating metals when using the heat treating process.

ANSWER SHEET FOR 'HEAT TREATMENT OF METALS'

1) To make it soft.

2) By heat treating the metal.

3) Yes

4) Yes

5) Yes

6) Yes

7) With the cutting torch or welding torch.

8) True

9) Expands

10) (a) Electricity . (b) Gas

ACCREDITATION NUMBER 9945

COURSE TITLE: WELDING - INTERMEDIATE

TERMINAL PERFORMANCE OBJECTIVE NO. 13.0 — INTRODUCTION TO ARC WELDING

Student will score at least 80% on a written test relating to arc welding.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		13.0	TEST ATTACHED.
13.1	Upon completion of a seriesof lectures and demonstrations, the student will with 100% accuracy answer questions relating to safety requirements for arc welding.	13.1	DESCRIBE: 1) Proper eye protection 2) Proper body protection 3) Ventilation requirements 4) Preventing electrical shock
13.2	Upon completion of a series of lectures and demonstrations, the student will with at least 80% accuracy answer questions relating to arc welding and supplies.	13.2	DESCRIBE: 1) AC Welding machines 2) DC Welding machines 3) AC/DC Welding machines 4) Electrode identification 5) Electrode selection 6) Machine settings and operation 7) Electric power sources 8) Electrode holders 9) Ground clamps and cables 10) Striking an arc
13.3	Given lectures and demonstrations on electric arc welding terms, the student will write or orally describe terms with at least 75% accuracy.	13.3	1) Define the term 'slag inclusion' 2) Define the term 'anode' 3) Define the term 'electrode' 4) Define the term 'reverse polarity'

INTRODUCTION TO ARC WELDING

1) Name some of the major industries that use arc welding extensively?

2. Name (3) different sizes of electrodes.

3. Name (3) basic welding positions.

4) Name one kind of metal that gives off toxic vapors when being welded.

5. Explain what is meant by straight polarity and reverse polarity.

6. What are some of the factors that cause electrodes to stick or freeze?

7. What happens during welding and the electrode stays stuck to the base metal?

8. What effect do you get when welding with the machine set too high?

9. What effect do you get when welding with the machine set too low?

10. What steps must be taken to overcome electrical shock when arc welding?

ANSWER SHEET FOR INTRODUCTION TO ARC WELDING

1) Automotive, Aircraft, Ship builders, Bridge building and repair, Building construction, Excavating industries, Foundries, Manufacturing industries, Petroleum industries.

2) 1/16" , 3/32" , 1/8", 5/32" , 3/16" , 1/4"

3) Flat, Vertical, Horizontal, Overhead

4) Cadmium, Zinc, Lead

5) Straight polarity is: work positive and electrode negative.
Reverse polarity is: work negative and electrode positive.

6) (a) Machine set too low. (b) Electrode is too close to the base metal.

7) The electrode will get red hot.

8) It tends to burn the weld, cause undercut, and/or burn a hole through the base metal.

9) You will get a weld that has little or no penetration.

10)
1) Turn off machine after use.
2) Wear gloves when welding.
3) Keep equipment dry. Do not stand in wet places when welding.

ACCREDITATION NUMBER 9945

COURSE TITLE: Welding - Intermediate

TERMINAL PERFORMANCE
OBJECTIVE NO. 14.0 Electric Arc Welding

Upon completion of a series of lectures and demonstrations with arc welding equipment and materials 80% of the students will perform with not less than 75% proficiency on a given performance test as judged by rating scale.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
14.1	Given lectures demonstrations, and shop handouts, the student will demonstrate how to select proper materials and properly run "stringer" beads on mild steel plate in the Flat Position with not less than 75% accuracy.	14.1	Select proper materials, and run "stringer" beads.
14.2	Given lectures, demonstrations, and shop handouts, the student will demonstrate how to select proper materials and properly weld, "butt" joints on mild steel plates in the Flat Position with not less than 75% accuracy.	14.2	Select proper materials, and weld "butt" joints in the Flat Position.
14.3	Given lectures, demonstrations, and shop handouts, the student will demonstrate how to select proper materials and properly weld a "lapp" joint on mild steel plates in the Flat Position with not less than 75% accuracy.	14.3	Select proper materials, and weld "lapp" joints in the Flat Position.
14.4	Given lectures, demonstrations, and shop handouts, the student will demonstrate how to select proper materials and properly weld a "tee" joint on mild steel plates in the Flat Position with not less than 75% accuracy.	14.4	Select proper materials, and weld "tee" joints in the Flat Position.

ACCREDITATION NUMBER 9945

COURSE TITLE: Welding - Intermediate

TERMINAL PERFORMANCE OBJECTIVE NOx 14.0 Electric Arc Welding

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
14.5	Given lectures, demonstrations, and shop handouts, the student will demonstrate how to select proper materials and properly weld a "butt" joint on mild steel plates in the Vertical Position with no less than 75% accuracy.	14.5	Select proper materials and weld 'butt' joints in the Vertical Position.
14.6	Given lectures, demonstrations, and shop handouts, the student will demonstrate how to select proper materials and properly weld a 'lapp' joint on mild steel plates in the Vertical Position with no less than 75% accuracy.	14.6	Select proper materials, and weld 'lapp' joints in the Vertical Position.
14.7	Given lectures, demonstrations, and shop' handouts, the student will demonstrate how to select proper materials and properly weld a 'tee' joint on mild steel plates in the Vertical Position with no less than 75% accuracy.	14.7	Select proper materials, and weld 'tee' joints in the Vertical Position.
14.8	Given lectures, demonstrations, and shop handouts, the student will demonstrate how to select proper materials and properly weld a 'butt' joint on mild steel plates in the Overhead Position with no less than 75% accuracy.	14.8	Select proper materials, and weld 'butt' joints in the Overhead Position
14.9	Given lectures, demonstrations, and shop handouts, the student will demonstrate how to select proper materials and properly weld a 'lapp' joint on mild steel plates in the Overhead Position with no less than 75% accuracy.	14.9	Select proper materials, and weld 'lapp' joints in the Overhead Position
14.10	Given lectures, demonstration, and shop handouts, the student will demonstate how to select proper materials and properly weld a 'tee' joint on mild steel plates in the Over head Position with no less than 75% accuracy.	14.10	Select proper materials, and weld 'tee' joints in the Overhead Position.

RATING SCALE

Material Selection	10%
Heat Selection	20%
Safety	10%
Fusion	20%
Bead	10%
Penetration	10%

ACCREDITATION NUMBER 9945

COURSE TITLE: Welding - Intermediate

TERMINAL PERFORMANCE OBJECTIVE NO. 15.0 (T.I.G.) Welding

Upon completion of a series of lectures and demonstrations on (TIG) welding equipment, encompassing the parts, their functions, manipulation, and safety precautions, 80% of the students will be able to demonstrate 70% accuracy on a written or oral test, and perform with 70% efficiency on a given performance test as judged by a rating sheet attached.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
15.1	Given lectures and demonstrations on (TIG) welding equipment, the student will recall at least 90% of the component parts.	15.1	Orally identify at least 90% of the parts on a (TIG) welding outfit.
15.2	Given lectures and demonstrations on the safety requirements related to (TIG) welding equipment, the student will with 100% proficiency pass a written test.	15.2	1) What kind of eye protection is required when performing (TIG) welding? 2) Name at least (1) way an operator can prevent electrical shock to himself when using the (TIG) process. 3) Name at least (1) article of clothing needed as a safety requirement when operating (TIG) equipment. 4) Why is it necessary for water to circulate through the torch when operating (TIG) equipment? 5) Name at least (1) metal that gives off harmful fumes when welded with the (TIG) process.
15.3	Given lectures and demonstrations on the functions of component parts of the (TIG) equipment, the student will with at least 80% accuracy orally explain their functions.	15.3	What is the principle of operation of the following parts of the (TIG) welder: 1) Flowmeter 2) Remote control 3) High Frequency control 4) Soft start 5) Foot pedal
15.4	Assigned a (TIG) welding station with necessary equipment and materials, the student will demonstrate at least 70% efficiency running continuous stringer beads on thin gauge aluminum.	15.4	Prepare plates and properly weld 'stringer' beads in the Flat position on the (TIG) welder.

ACCREDITATION NUMBER 9945

COURSE TITLE: Welding - Intermediate

TERMINAL PERFORMANCE OBJECTIVE NO. 15.0 (T.I.G.) Welding

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
15.5	Assigned a (TIG) welding station with necessary equipment and materials, the student will demonstrate at least 70% efficiency welding continuous stringer beads on thin gauge aluminum.	15.5	Prepare plates and properly Weld 'Butt' Joints in the Flat Position on the (TIG) welder.
15.6	Assigned a (TIG) welding station with necessary equipment and materials, the student will demonstrate at least 70% efficiency welding 'lapp' joints on thin gauge aluminum.	15.6	Prepare plates and properly Weld 'Lapp' Joints in the Flat Position on the (TIG) welder.
15.7	Assigned a (TIG) welding station with necessary equipment and materials, the student will demonstrate at least 70% efficiency welding 'tee' joints on thin gauge aluminum.	15.7	Prepare plates and properly Weld 'Tee' Joints in the Flat Position on the (TIG) welder.
15.8	Assigned a (TIG) welding station with necessary equipment and materials, the student will demonstrate at least 70% efficiency running 'stringer' beads on thin gauge stainless steel.	15.8	Prepare plates and properly run continuous 'Stringer' Beads in the Flat Position on the (TIG) welder.
15.9	Assigned a (TIG) welding station with necessary equipment and materials, the student will demonstrate at least 80% e efficiency running fusion beads on 'lapp' joints using thin gauge stainless steel.	15.9	Prepare plates and properly fusion Weld 'Lapp' Joints in the Flat Position on the (TIG) welder.
15.10	Assigned a (TIG) welding station with necessary equipment and materials, the student will demonstrate at least 70% efficiency welding 'tee' joints on thin gauge steel.	15.10	Prepare plates and properly Weld 'Tee' Joints in the Flat Position on the (TIG) welder.

ACCREDITATION NUMBER 9945

COURSE TITLE: Welding - Intermediate

TERMINAL PERFORMANCE
OBJECTIVE NO. 15.0

(T.I.G.) Welding

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES		NO.	CRITERION MEASURES
	RATING SCALE			
1)	MATERIAL SELECTION	10%		
2)	HEAT SELECTION	20%		
3)	SAFETY	10%		
4)	FUSION	20%		
5)	BEAD	10%		
6)	PENETRATION	30%		

ACCREDITATION NUMBER 9945

COURSE TITLE: WELDING - INTERMEDIATE

TERMINAL PERFORMANCE
OBJECTIVE NO. 16.0 (M.I.G.) WELDING

Upon completion of a series of lectures and demonstrations on (MIG) welding equipment encompassing the parts, their functions, manipulation and safety precautions, 80% of the students will be able to demonstrate 70% accuracy on a written or oral test, and perform with 70% efficiency on a given performance test as judged by a rating sheet attached

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
16.1	Given lectures and demonstrations on (MIG) welding equipment the student will recall the major component parts of (MIG) welding outfit with 90% accuracy.	16.1	Orally identify no less than 90% of the component parts on a (MIG) welding outfit.
16.2	Given lectures and demonstrations on the safety requirements related to (MIG) welding equipment the student will with 100% proficiency pass a written or oral test.	16.2	1) What kind of eye protection is required when performing (MIG) welding? 2) Name at least (1) way an operator can prevent electrical shock to himself when using the (MIG) process. 3) Name at least (1) article of clothing needed as a safety requirement when operating (MIG) equipment. 4) Why is good ventilation needed when welding galvanized metal? 5) What type of clothing is required when welding in the overhead position?
16.3	Given lectures and demonstrations on the functions of component parts of the (MIG) equipment, the student will with at least 80% accuracy orally explain their functions.	16.3	What is the principle of operation of the following parts of arc Welding: 1) Flowmeter 2) Wire Feeder 3) Welding Gun
16.4	Assigned a (MIG) welding station with necessary equipment and materials, the students will demonstrate at least 70% efficiency running continuous stringer beads on mild steel plates.	16.4	Prepare plates and properly weld "stringer" beads in the flat positions on the MIG welder.

RATING SCALE

Material Selection	10%
Heat Selection	20%
Safety	10%
Fusion	20%
Bead	10%
Penetration	30%

ACCREDITATION NUMBER 9945

COURSE TITLE: WELDING - INTERMEDIATE

TERMINAL PERFORMANCE
OBJECTIVE NO. 17.0 BLUE PRINT READING

Upon completion of this unit on blue print reading, the student will be able to demonstrate and describe (orally or written) blue prints and drawing as used in the field of welding with 70% accuracy.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
17.1	Student will demonstrate 70% accuracy interpreting a working drawing.	17.1	**Read the drawing provided you and write:** 1) Shape of every part of the object. 2) Size of all parts. 3) Kind of material 4) Kind of finish 5) How many pieces of each part are wanted.
17.2	Student will demonstrate knowledge of prints and drawings by naming and defining at least three.	17.2	Given various prints and drawings the following: DESCRIBE: 1) Shop drawing 2) Shop sketch 3) Blue print
17.3	Student will demonstrate knowledge of welding symbols by drawing at least (5)	17.3	Given necessary tools and material draw the following symbols: 1) Multiple pass build-up 2) Plug weld 3) Spot weld 4) Fillet weld 5) Melt thru weld 6) Weld all around 7) Rossette weld 8) Square butt joint 9) Single "V" joint 10) Double "V" joint